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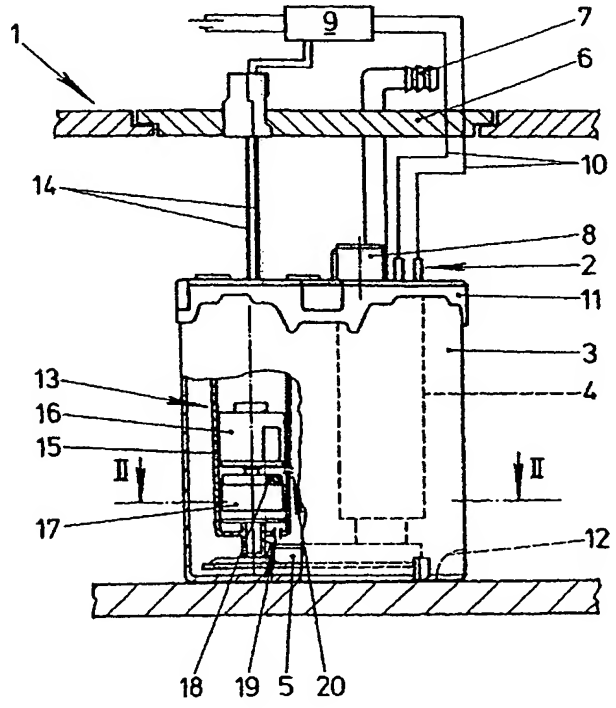
(54) Title: FUEL DELIVERY UNIT

(54) Bezeichnung: KRAFTSTOFF-FÖRDEREINHEIT



(57) Abstract: The invention relates to a fuel delivery unit (2) that is disposed in the fuel tank (1) of a motor vehicle. Said delivery unit comprises a level sensor (13) that detects when the amount of fuel in a baffle pot (3) falls below a minimum amount. When the fuel in the baffle pot (3) falls below a defined minimum, the supply of power to a delivery pump (4) that is driven by an electromotor is interrupted, thereby preventing the delivery pump (4) from delivering air when the baffle pot (3) is empty.

(57) Zusammenfassung: Bei einer in einem Kraftstoffbehälter (1) eines Kraftfahrzeuges angeordneten Kraftstoff-Fördereinheit (2) erfasst ein Füllstandssensor (13) ein Unterschreiten einer Mindestmenge an Kraftstoff in einem Schwalltopf (3). Bei Unterschreitung der vorgesehenen Mindestmenge an Kraftstoff in dem Schwalltopf (3) wird eine Bestromung einer elektromotorisch angetriebenen Förderpumpe (4) verhindert. Hierdurch wird vermieden, dass die Förderpumpe (4) bei leerem Schwalltopf (3) Luft fördert.

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For an explanation of the two-letter codes and the other abbreviations, reference is made to the explanations ("Guidance Notes on Codes and Abbreviations") at the beginning of each regular edition of the PCT Gazette.

Description

FUEL DELIVERY UNIT

The invention relates to a fuel delivery unit which is provided for arrangement in a fuel tank of a motor vehicle, having a baffle pot for collecting fuel and having a delivery pump for delivering fuel from the baffle pot to an internal combustion engine of the motor vehicle.

Fuel pumps of this type are frequently used in modern motor vehicles and are known from practice. The baffle pot is generally arranged at a location in the fuel tank in which it is preferably filled during a first filling. The baffle pot is therefore also filled if the fuel tank has run empty, and a small amount of, for example, 5 liters of reserve fuel is fed in.

A disadvantage of the known fuel delivery units is, however, that, when the baffle pot is virtually empty, air can be sucked in by the delivery pump and can accumulate in the lines leading to the internal combustion engine. When reserve fuel is fed in, the air situated in the lines prevents fuel from being able to be delivered to the internal combustion engine. Furthermore, the delivery pump may be damaged if it runs dry.

The invention is based on the object of designing a fuel delivery unit of the type mentioned at the beginning in such a manner that it reliably prevents air from passing into the lines leading to the internal combustion engine.

This problem is solved according to the invention by the baffle pot having a level sensor for detecting the

level of fuel contained in it, and by the level sensor being designed for activating the delivery pump.

This design enables the delivery pump to be activated as a function of the filling of the baffle pot. This makes it possible to switch off the delivery pump if the fuel level in the baffle pot drops below a designated limit. It can therefore be ensured that the suction region of the delivery pump is situated at all times below the fuel level. Therefore, even if the baffle pot is virtually empty, air is reliably prevented from being sucked up by the delivery pump and blocking the lines leading to the internal combustion engine. In addition, damage to the delivery pump by it running dry is reliably prevented.

According to an advantageous development of the invention, the level sensor can be manufactured particularly cost-effectively if it has a reed switch. Furthermore, a reed switch of this type delivers an unambiguous switching signal which can be reliably assigned to a certain filling level of fuel.

According to another advantageous development of the invention, the level sensor is particularly stable if it has a pipe extending over a subregion of the height of the baffle pot.

The fuel delivery unit according to the invention can be fitted in a particularly simple manner if the pipe of the level sensor is fastened to a cover of the baffle pot and projects into the baffle pot.

Jamming of the level sensor can be reliably prevented, according to another advantageous development of the invention, if a float of the level sensor is guided on the pipe. This also ensures that, after the delivery pump has been switched off, a feeding-in of reserve

fuel can be detected and the delivery pump can be started up again.

According to another advantageous development of the invention, the level sensor turns out to be particularly compact and is of particularly simple construction if a magnetic switch of the level sensor and the float are arranged in the pipe.

Sloshing movements of the fuel may have a short-term effect on the level sensor and erroneously signal that the fuel in the baffle pot has dropped below a minimum amount. According to another advantageous development of the invention, the influence of sloshing movements of the fuel can be kept particularly small if the pipe of the level sensor has a constricting opening. The constricting opening constricts the flow of air or fuel and therefore damps the movements of the fuel in the pipe.

Magnetic fields of an electric motor driving the delivery pump may result in faulty signals of the level sensor. However, according to another advantageous development of the invention, the influence of the magnetic fields of the electric motor on the level sensor can be kept particularly small if the level sensor is spaced apart from the delivery pump. The pipe is preferably arranged spatially separated from the delivery pump.

The activation of the delivery pump driven by the electric motor does not require any additional components, apart from the level sensor, if the level sensor has a switch and is connected directly to the delivery pump.

If the level sensor should fail, the fuel delivery unit according to the invention can be operated at least with an emergency program by means of an electronic

control system for detecting signals of the level sensor and for

activating t[redacted] delivery pump. An electro[redacted] control system of this type can be used, in addition, to detect fluctuations of the fuel level in the baffle pot. The level sensor does not therefore require any mechanical damping elements or constricting openings.

The invention permits numerous embodiments. To further clarify its basic principle, one of these is illustrated in the drawing and is described below. In the drawing

Fig. 1 shows a partial section through a fuel delivery unit according to the invention fitted in a fuel tank,

Fig. 2 shows a sectional illustration through the fuel delivery unit according to the invention from figure 1 along the line II-II.

Figure 1 shows a fuel tank 1 of a motor vehicle having a fuel delivery unit 2 which is arranged in it and is intended for delivering fuel. The fuel delivery unit 2 has a delivery pump 4 which is arranged in a baffle pot 3 and is driven by an electric motor. The delivery pump 4 delivers fuel via a filter 5, which is arranged in the baffle pot 3, to a connecting branch 7 arranged on an installation flange 6 of the fuel tank 1. A forward flow line (not illustrated) leading to an internal combustion engine of the motor vehicle can be connected to the connecting branch 7. The pressure delivered by the delivery pump 4 is limited by a pressure regulator 8. The delivery pump 4 is supplied with electric current by an electronic control system 9 via electric lines 10. The baffle pot 3 is latched to a cover 11. The cover 11 enables the baffle pot 3 to exchange air with the remaining regions of the fuel tank 1 and enables fuel to pass in from above into the baffle pot 3. The baffle pot 3 also has a bottom valve

12 via which fuel can pass into the baffle pot 3, but cannot escape. The baffle pot 3 can, of course, additionally be filled with fuel via a suction jet pump (not illustrated).

A level sensor 13 is arranged in the baffle pot 3 at a distance from the delivery pump 4. The level sensor 13 is likewise connected via electric lines 14 to the electronic control system 9 and has a pipe 15 which is fastened to the cover 11 of the baffle pot 3. A reed switch 16 is arranged within the pipe 15 and is opposite a float 17. The float 17 bears a magnet 18 and moves slightly with the fuel level in the baffle pot 3. In order to ensure that the pipe 15 exchanges flow with the baffle pot 3, the pipe 15 has openings 19, 20. These openings 19, 20 may be designed as constricting openings in order to damp sloshing movements of the fuel against the float 17. When there is a sufficient fuel level in the baffle pot 3, the float 17 is pressed upward against the reed switch 16 by means of the magnet 18. The level sensor 13 then supplies a signal to the electronic control system 9 which enables the delivery pump 4 to be supplied with power. If the fuel level in the baffle pot 3 drops below the minimum value, the magnet 18 moves away from the reed switch 16, whereupon the latter supplies a signal to the electronic control system 9. The electronic control system 9 then suppresses the supply of power to the delivery pump 4.

Figure 2 shows, in a sectional illustration through the baffle pot 3 together with the fuel delivery unit 2 from figure 1 along the line II-II, that the pipe 15 of the level sensor 13 is at a distance from the delivery pump 4. This prevents the reed switch 16 from being influenced by electromagnetic fields of the electric drive of the delivery pump 4. Figure 2 furthermore shows that the baffle pot 3 has connecting elements 21 for a holder (not illustrated).

Holders of this type are fastened to the installation flange 6 (illustrated in figure 1) and prestress the baffle pot 3 toward the bottom of the fuel tank 1.

Patent Claims

1. A fuel delivery unit which is provided for arrangement in a fuel tank of a motor vehicle, having a baffle pot for collecting fuel and having a delivery pump for delivering fuel from the baffle pot to an internal combustion engine of the motor vehicle, characterized in that the baffle pot (3) has a level sensor (13) for detecting the level of fuel contained in it, and in that the level sensor (13) is designed for activating the delivery pump (4).

2. The fuel delivery unit as claimed in claim 1, characterized in that the level sensor (13) has a reed switch (16).

3. The fuel delivery unit as claimed in claim 1 or 2, characterized in that the level sensor (13) has a pipe (15) extending over a subregion of the height of the baffle pot (3).

4. The fuel delivery unit as claimed in at least one of the preceding claims, characterized in that the pipe (15) of the level sensor (13) is fastened to a cover (11) of the baffle pot (3) and projects into the baffle pot (3).

5. The fuel delivery unit as claimed in at least one of the preceding claims, characterized in that a float (17) of the level sensor (13) is guided on the pipe (15).

6. The fuel delivery unit as claimed in at least one of the preceding claims, characterized in that the reed switch (16) of the level sensor (13) and the float (17) are arranged in the pipe (15).

7. The fuel delivery unit as claimed in at least one of the preceding claims, characterized in that the pipe (15) of the level sensor (13) has a constricting opening (openings 19, 20).

8. The fuel delivery unit as claimed in at least one of the preceding claims, characterized in that the level sensor (13) is spaced apart from the delivery pump (4).

9. The fuel delivery unit as claimed in at least one of the preceding claims, characterized in that the level sensor (13) has a switch (reed switch 16) and is connected directly to the delivery pump (4).

10. The fuel delivery unit as claimed in at least one of the preceding claims, characterized by an electronic control system (9) for detecting signals of the level sensor (13) and for activating the delivery pump (4).

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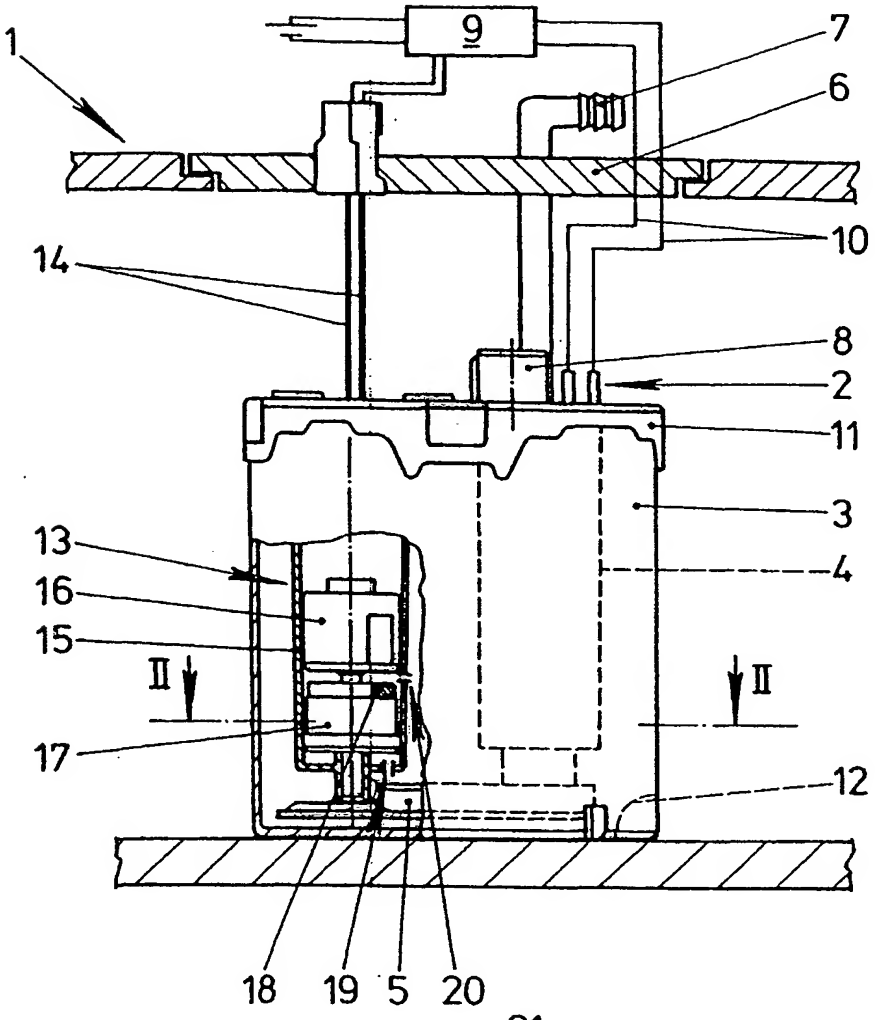

Fig.1

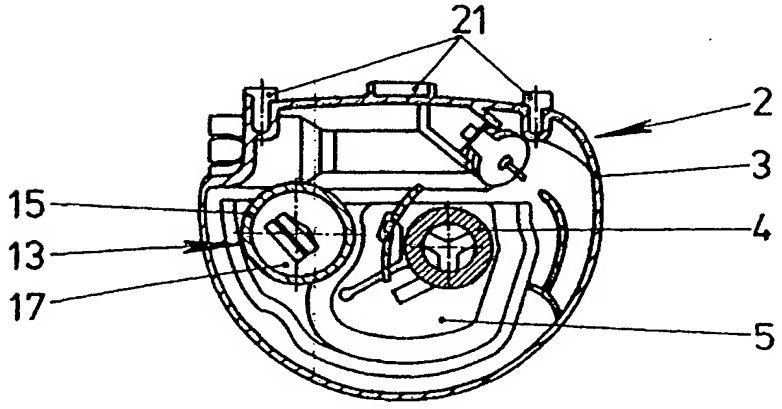

Fig. 2